

3

PULSATING GANGRENE OF THE LUNG

BY

JOHN LINDSAY STEVEN, M.D., F.F.P.S. GLASG.,

PHYSICIAN AND LECTURER ON CLINICAL MEDICINE, GLASGOW ROYAL INFIRMARY;
MEMBER OF THE GENERAL MEDICAL COUNCIL, ETC.

Reprinted from THE LANCET October 15 1904



PULSATING GANGRENE OF THE LUNG.

PULSATING gangrene of the lung is a morbid condition of which I have not been able to find any description in the medical literature to which I have access and I have therefore determined to publish the notes of a case which occurred in my wards in the Glasgow Royal Infirmary in 1898. I also think the case worthy of record because it seems to me to assist towards the explanation of the pulsation in that somewhat rare but very well known affection, pulsating empyema. Under the name of "pulsating empyema of necessity" in 1844 Robert L. MacDonnell of Dublin was the first in this country to call attention to this interesting and rare condition.¹ He reported three cases, two of which were verified by post-mortem examination. In all of them pulsating tumours appeared on the left side of the chest, one in the cardiac region and the other two at the lower part of the left side. Dr. Chambers thus explains Dr. MacDonnell's use of the term.² "The latter was called by Dr. MacDonnell 'pulsating empyema of necessity,' as the term 'empyema of necessity' was always applied by the older writers to cases where the pus works its way outwards and forms a tumour." In a subsequent essay, however, Dr. MacDonnell abandoned the term. The next important contribution to the subject was the thesis of Dr. Jules Comby in 1881, "*De l'Empyème Pulsatile*," republished in an extended form in 1883.³ Dr. Comby reports 27 cases in all, among them those of Dr. MacDonnell, and he enters into a full discussion of the symptoms and diagnosis of the affection. It is to be distinguished, according to the French physician, from "pneumonie pulsatile," "cancer pulsatile du poumon," and "anévrisme de l'aorte." In referring to pulsating cancer of the lung as a disease likely to be mistaken for empyema pulsans Dr. Comby is following Dr. MacDonnell; it is noteworthy, however, that Dr. MacDonnell apparently had never seen a case of the kind and his remarks on the subject are purely theoretical.

The contribution by Dr. Samuel West⁴ in 1897 is im-

¹ Contributions to the Diagnosis of Empyema, with cases, Dublin Journal of Medical Science, 1844, vol. xxv., p. 1.

² Pulsating Empyema after Acute Pleuritis; a Swelling above the Left Nipple which Burst Spontaneously; Recovery, THE LANCET, May 31st, 1862, p. 573.

³ Les Pleurésies Pulsatiles (Empyème Pulsatile), Archives Générales de Médecine, 1883, vol. ii., pp. 549, 689.

⁴ Pulsating Empyema (Empyema Pulsans), Transactions of the Royal Medical and Chirurgical Society, 1897, vol. lxxx., p. 239.

portant. "Empyema may pulsate," he says, "but distinct pulsation is certainly a very rare phenomenon. The fact remains that distinct pulsation is very rare." Dr. Comby in 1883 gave notes of the published records of 27 cases; "Wilson in 1893 brings up the number of published cases to 68." The pulsation is of two kinds: (1) a general shock or intra-pleural pulsation; and (2) expansile pulsation or extra-pleural pulsation. Such is Dr. West's classification of the affection. He continues his paper by entering upon a discussion of the diagnosis of the two varieties and concludes it with observations upon the explanation of the phenomenon, pointing out that "there appear to be three different kinds of pulsation." I agree entirely with him in his remarks upon the "pulsating pneumonia" of Graves. "As to the existence even of pneumonia pulsans I am very sceptical," writes Dr. West, and I am quite at one with him. Graves's account of pulsating pneumonia—a common occurrence according to him—is to be found in his clinical lectures,⁵ but few, I think, will now agree with the explanation he gives of the cause of the pulsation. I have already said that Dr. West's paper is an important contribution on this interesting clinical condition and it is therefore perhaps necessary to point out one or two bibliographical and typographical errors. Dr. Robert L. MacDonnell did not spell his name "Macdonald" and he did not publish his paper in "1854."⁶ The title of Dr. Comby's paper in the *Archives Générales de Médecine*, 1883, vol. ii., was not "Thesis d'Empyème Pulsatile"⁷ but "Les Pleurésies Pulsatiles (Empyème Pulsatile)," which was an expansion of his thesis entitled "De l'Empyème Pulsatile," published Dec. 30th, 1881. Such errors may seem trifling but they are apt to grow and I find that some of them have already reappeared in Dr. West's valuable treatise on "Diseases of the Lungs."

An important article on pulsatile empyema has also been written by Dieulafoy⁸ in which he expresses his preference for the term "empyème pulsatile" rather than that of "pleurésie pulsatile" as adopted by Dr. Comby in his second monograph. He thinks the effusion in such cases is practically always purulent and that pulsating empyema always occurs on the left side. He supports his views by two cases of his own. I may finish these short historical notes by reference to the interesting paper of Dr. E. M. Light,⁹ in which an account of three cases is given in careful detail. All had external swellings, two occurred in children, and in all the pulsation was "synchronous with the cardiac impulse and systolic in time." In this connexion it may be worthy of note that Dr. MacDonnell described the pulsation as "a strong diastolic pulsation."¹⁰

⁵ New Sydenham Society's edition, London, 1884, vol. ii., p. 45-47.

⁶ Loc. cit., p. 240 and p. 240 footnote.

⁷ Loc. cit., p. 239 footnote.

⁸ Manuel de Pathologie Interne, 1901, thirteenth edition tome i., p. 531.

⁹ Notes on Three Cases of Pulsating Empyema, THE LANCET, Sept. 26th, 1891, p. 704.

¹⁰ Loc. cit., p. 4 et seq.

The case of pulsating gangrene of the lung now to be described is related to pulsating empyema merely by the clinical fact of pulsation. In the foregoing literary note references are found to pulsating pneumonia and to pulsatile cancer of the lung; both of these conditions are, perhaps, more intimately related to the morbid state with which I am now dealing than pulsating empyema, but of neither of them can I find any detailed pathological or clinical account. In the present case the gangrene was verified post mortem and the intimate relationship of the large gangrenous cavity to the pericardium sufficiently explained the pulsation of the chest-wall at the left base posteriorly which was discovered during life.

Clinical report by the house physician, Mr. George Coats, M.B.—A woman, aged 37 years, was admitted to Ward 8 of the Glasgow Royal Infirmary on Nov. 29th, 1898, and died Dec. 16th, 1898. She complained of pain in the left side, cough and spit of about five days' duration. Two weeks previous to the onset of the above symptoms patient had an ordinary cold. On Nov. 24th she suddenly became worse and then complained of the severe pain in the left side which was aggravated by a long breath. For about four days previous to the onset of the pain she had complained of rigors and severe pain in the small of the back. On Nov. 24th she had a more severe rigor and after that the cough was much aggravated and began to be accompanied by a somewhat profuse spit, at first white, later somewhat brown and dark. She was seen first by her doctor on Nov. 24th and was then put on a diet of milk and soda water. With the exception of a little gruel and beef-tea she has continued the limited diet. She was not aware of any delirium but sleep at night had been only in snatches. The pain in the side was very troublesome when she coughed. The bowels were constipated and during the last three days there had been no motion.

Examined Nov. 29th, 1898. The patient lies easily in bed. The face is somewhat flushed and on the whole rather suggestive of acute pulmonary disease. The pupils are medium and active. The tongue is flabby and indented, clean at the edges but coated elsewhere with a creamy white fur. The respirations are shallow and number 32-34 per minute. The pulse is small and of fair tension, registering 100 per minute. The expectoration is not very characteristic of pneumonia, consisting of isolated rather nummular pellets of a slightly brownish tinge floating in frothy mucus. The cough is loose but restrained as if from desire to prevent pain. The decubitus is either dorsal or on the right side. The patient states that it is painful to lie on the left side.

Chest.—On inspection of the anterior aspect a slight degree of fulness is visible over the left front, from the level of the second space downwards, so that the intercostal spaces, which are well seen on the right side, are not visible on the left. Both to inspection and palpation the respiratory movement in the left front and axillary regions is slightly diminished. Percussion in front is everywhere resonant and no abnormality of the respiratory murmur is anywhere detected.

Posteriorly there is distinct comparative dullness over the whole left base from the level of the mid-seapular region downwards, but auscultatory phenomena are quite indefinite, the respiratory murmur being on the whole normal over the dull area and unaccompanied by r  le.

The heart.—The apex beat is visible and palpable as a somewhat diffuse impulse in the fourth interspace, three inches to the left of the middle line. The cardiac area is not enlarged, the upper border corresponds to the fourth left interspace, the right border is in the middle line, and the left border two and a half inches to the left of the middle line. The first sound at the apex and indeed all over the cardiac area is sharp, abrupt, and somewhat slapping in character. At the base the second sound is well articulated, though not unduly loud. In the apex region a short superficial systolic murmur is occasionally

heard and is carried towards the axilla and the pulmonic area but is not audible in the aortic area. There is no history of rheumatism, though she has occasionally suffered from rheumatic pains in the right shoulder.

Urine.—Specific gravity 1022, slightly acid, deep amber colour, no albumin, no sugar, a slight diminution of chlorides.

Note by Dr. Lindsay Steven.—The clinical history indicates on the whole an acute pneumonia, supervening upon a common cold. The physical signs are, however, quite indefinite with the exception of the dulness at the left base and the slightly rusty spit. The cardiac murmur is slightly variable in intensity and possesses a character which is rather suggestive of extracardial origin. The obliteration of the intercostal spaces on the left side may be due to voluntary fixation to avoid pain, though the possibility of pleural involvement must be kept in mind.

Dec. 1st, 1898 (Dr. Steven).—The general condition of the patient is perhaps a little improved, but the temperature shows a distinct tendency to a highly irregularly remittent type, in the 24 hours ranging between 99·2° and 102·8° F. 3. The pulse this morning numbers 82, the respirations 32. The physical signs have undergone no marked change except that at and about the lower angle of the left scapula pretty abundant coarse crackling râles both with inspiration and expiration are audible. It is thought possible that the condition of the first sound at the apex may indicate a mitral stenosis. The chief change in the case is the supervention of a highly offensive and somewhat gangrenous odour of the sputum, which likewise has changed from its brown colour to a dirty grey. The pain in the left side is not now complained of.

Dec. 2nd (Dr. Steven).—A notable feature in the case this morning is a marked diminution, if not complete absence, of the respiratory murmur in the left infra-clavicular region, contrasting strikingly with a somewhat exaggerated respiratory murmur, vesicular in quality, over the right infra-clavicular region. The apex beat is still in the same situation and the first sound presents similar characters. Occasionally at the level of the third left cartilage and over the apex a faint pleuro-pericardial friction is heard. The same comparative enfeeblement of respiratory murmur prevails over the whole left back and dulness is more absolute than before below the level of the angle of the left scapula. The râles are very scanty, none being audible in the dull area, although yesterday moist crackling râles with inspiration and expiration were heard in the axillary line in the dull area. The sputum is very distinctly foetid, although hardly gangrenous in odour, and at the time of this note a minute speck of blood is noted for the first time.

Dec. 6th (Dr. Steven).—The cough is now very severe and frequent, apt to be paroxysmal. The color of the sputum is still pronounced. The general appearance is much deteriorated and during the last three or four nights profuse perspiration, necessitating change of dress, has occurred. The temperature is still irregularly remittent; maxima about 102°, minima about 99·4°. The pulse ranges between 80 and 90, the respirations between 20 and 30. There is still very marked dulness over the whole left base posteriorly, with great enfeeblement of the respiratory murmur, which is almost inaudible, though judged to be tubular in quality. Occasionally a crackle can be made out in the left infra-axillary region.

Dec. 13th (Dr. Steven).—Since the date of the last note a low type of fever of a somewhat continued character has been recorded, the base line of a four-hourly chart being situated at 100°, the maximum and minimum records during five consecutive days being 101° and 99° respectively and these only on two occasions. The pulse ranged between 85 and 100; the respirations about 30. During the last four days from two and a half to four ounces of expectoration have been expelled daily. Yesterday evening about 7 P.M. she became rather sick after taking creasote. The sickness brought on a paroxysm of coughing which ended in the expectoration of about one ounce of bright-red frothy blood, which this morning is found to be partially

coagulated. The pulse to-day is small, regular in force and rhythm, and numbers about 90. The respirations are about 36 and not obviously laboured. The tongue is pale and coated with a yellowish white fur. The complexion is pallid and the face somewhat anxious-looking. The chest anteriorly shows perhaps a slight flattening in the right infra-clavicular region, but no diminution of movement. Percussion and auscultation over the lungs in front yield normal results. The respiratory murmur presents a healthy quality and is equal on both sides. Posteriorly, there is slight flattening and perhaps slightly defective movement at the left base. The vocal fremitus over the dull area is distinctly diminished. The dullness of the left base begins at the sixth dorsal spine, from which its upper margin slopes gently downwards and outwards, cutting the sixth rib in the mid-axillary line. Auscultation reveals a deficient respiratory murmur not obviously tubular over the whole dull area and scanty irregular râles. The factor of the expectoration is also improved. The occurrence of the hæmoptysis in succession to the events noted in the foregoing report renders it pretty certain that a limited necrosis in the base of the left lung has followed the pneumonia.

Dec. 15th (Dr. Steven).—On examining the left base this morning it is noticed that the cardiac sounds are heard with great distinctness in the dull area and further that a very distinct cardiac impulse is felt in the same place.

Dec. 16th.—The patient died this evening about 7.30. The grave symptoms may be dated from Dec. 12th, when she first had hæmoptysis as noted in the entry of Dec. 13th. After the hæmoptysis the temperature rose to 103.4°, falling the next day at noon to 98°, only to rise again in the evening to 104.6°. During Dec. 13th she had hæmoptysis to the amount of 16 ounces. In the early morning of Dec. 14th she had a rather severe rigor, followed by a temperature of 105°, and in the evening the temperature was 104° after having touched 103° at noon. Since then the temperature has pursued a highly irregular remittent course but with on the whole a downward tendency. Hæmoptysis on Dec. 12th was five ounces; Dec. 15th, ten ounces; Dec. 16th, before her death, four ounces; latterly, however, there was only altered black blood, no bright red hæmorrhage. Respirations ranged between 30 and 40 and the pulse between 100 and 140. The factor of the expectoration was very marked to the end and the cough was throughout troublesome. About noon of Dec. 16th a marked change for the worse took place in the patient's condition, the respirations becoming very much embarrassed, and the pulse beginning to fail. Free stimulation was resorted to, but in spite of this she sank and died. During the day there was considerable diarrhœa, the motions being very dark and tarry.

Dec. 18th, 1898. Post-mortem examination.—Well-nourished body. Rigor mortis moderately developed. Pupils dilated and slightly unequal, the left being rather the smaller. On exposing the peritoneal cavity the stomach is found to be considerably dilated and bent upon itself so that the greater curvature at its lower point is only four inches above the level of the symphysis. The pericardium contains about 12 ounces of clear serous fluid in which one or two loose gelatinous clots are suspended. The surface of both layers of the pericardium is smooth, there being no fibrinous exudation. The heart is small and rather pale. It weighs eight ounces. The mitral orifice has a circumference of 91 millimetres and the tricuspid 145 millimetres. The pulmonary and aortic orifices are quite competent and all the valvular curtains are quite normal in structure. The structure of the aortic arch is normal. The right lung is quite non-adherent and is voluminous. It is not intensely pigmented and its anterior margins are suggestive of very slight emphysema. The whole substance of the organ is very highly œdematous but otherwise the parenchyma shows nothing unusual. The bronchial mucous membrane is intensely hyperæmic in the larger and medium bronchi. On dealing with the left lung it is found to be firmly adherent posteriorly from apex to base. Projecting through the left aspect of the pericardium, to which the lung is firmly adherent, is seen a fluctuating swelling which is bounded below by the diaphragm and externally by the lower lobe of the adherent left lung. In order to permit of a more thorough investigation of this swelling the abdominal organs are removed before the lung

and the swelling are removed. The liver is pale but healthy in appearance and weighs 52 ounces; the gall-bladder contains normal bile. The dilated stomach is opened along its lesser curvature. It contains a large quantity of brown fluid. The internal surface near the pylorus is covered with shredded mucus, but the mucous membrane shows no abrasion. The fibres of the pyloric ring are well developed. Appearances are those of atonic distension with catarrh of mucous membrane and diapedetic hæmorrhage. The spleen is large and soft and its vessel walls contain yellow nodules like cascating miliary tubercles. The kidneys are slightly enlarged; the left weighs seven ounces as also the right. Their capsules slightly adherent with small cysts. With difficulty the left lung is removed and it is found that the pericardial swelling does not disappear in the process. The left lower lobe on dissection is found to be the seat of a large gangrenous cavity filled with necrosed lung tissue and blood, the cavity occupying almost the whole substance of the lobe. The pericardial swelling had been caused by the cavity bulging into the pericardium and it entirely disappeared when the lung was cut into. There was no lung tissue between the left wall of the pericardium and the pulmonary cavity, so that the pericardial wall formed the inner surface of the gangrenous excavation in the adherent left lung. This anatomical condition is of interest in connexion with the distinct pulsation felt during life over the lower lobe behind and the clear transmission of the heart sounds in the same situation.

Such is the case as recorded in the ward journal. The post-mortem examination clearly proved that the pulsation was caused by the intimate relationship of the gangrenous lower lobe of the left lung to the left surface of the pericardial sac. It is also of interest that there was a distinct tumour-like projection inwards of the pericardial wall which would receive the systolic shock of the heart, and this was transmitted to the chest wall through the semi-fluid contents of the gangrenous cavity. There was no localised bulging of the chest wall, as in most of the cases of pulsating empyema—the bulging was internal into the pericardium. The pulsation was distinctly felt in the intercostal spaces of the left axilla and at the base behind and was of the same character as that felt over the apex beat of the heart. It was a distinct systolic pulse. Making use of West's classification it corresponded to his "intra-pleural pulsation," but it was, of course, intrapulmonic. This being so it might be suggested that the terms "intra-thoracic" and "extra-thoracic" might better describe the pulsation in the first instance until at least it is determined whether the disease is pleural or pulmonary in origin.

It is worthy of note also that the heart was neither hypertrophied nor fixed and that the left lung was everywhere so firmly adherent that it was removed with difficulty from the thoracic cavity. Applying the anatomical conditions found in the present case to the explanation of the cause of pulsating empyema they would seem to indicate that in order for an empyema to pulsate the pus-filled cavity must directly abut upon the pericardium and the adjoining lung must be firmly bound to the chest wall by adhesions. It is unnecessary apparently that the heart should either be hypertrophied, displaced, or fixed.

I am indebted to my pupil, Dr. D. Annabelle McGregor, for carefully extracting the notes of the case from the ward journal.

Glasgow.

Printed at The Lancet Office, 423, Strand, W.C.